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**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

**Application by New York Telephone Company** )  
**(d/b/a Bell Atlantic - New York), Bell Atlantic** )  
**Communications, Inc., NYNEX Long Distance** )  
**Company, and Bell Atlantic Global Networks,** ) **CC Docket No. 99-295**  
**Inc., for Authorization to Provide In-Region,** )  
**InterLATA Services in New York** )

**JOINT DECLARATION OF  
DR. GEORGE S. FORD AND  
DR. JOHN D. JACKSON  
ON BEHALF OF MCI WORLD COM**

George S. Ford and John D. Jackson hereby declare and state as follows:

1. My name is George S. Ford. My current position is Senior Economist in MCI WorldCom's Public Policy Department. After receiving my Ph.D. in economics from Auburn University, I served at the Federal Communications Commission for two years as an economist in the Competition Division of the Office of the General Counsel. While at the Commission, I worked on a wide-range of topics covering the full spectrum of the Commission's regulatory authority including the implementation of the Telecommunications Act of 1996. My specialties include the economic study of regulatory and industrial economics and the application of economics and econometrics to business decisions. I have published several articles on regulation, antitrust, industrial economics, and communications policy in journals including the *Journal of Law and Economics*, the *Journal of Regulatory Economics*, the *Review of Industrial Organization*, among others. My office is located at 1801 Pennsylvania Avenue, N.W., Washington, D.C. 20006, and my telephone number is (202) 887-2909. My curriculum vitae is attached as Attachment 1.

2. My name is John D. Jackson. I hold the title of Professor of Economics in the Department of Economics, College of Business, Auburn University, Auburn, Alabama. I received my bachelor's and master's degrees in economics at the University of Texas at Arlington, and I received my Ph.D. from the Claremont Graduate School, Claremont, CA, in 1977. During the past twenty-five years, I have held professorial positions at a number of colleges and universities, including The College of the Holy Cross, Old Dominion University, and Louisiana Tech University. For eighteen of those years, I have been employed in the Department of Economics at Auburn University, the last ten years, at the rank of Professor. My research interests are in applied econometrics,

macroeconomics, and applied microeconomics, and I have fifty publications, most of which fall under one of these general topic headings, in peer reviewed scholarly journals. For the past year, I have been working with MCI WorldCom as a statistical consultant on matters relating to the Telecommunications Act of 1996. My office is located at Auburn University, 203 Lowder Business Building, Auburn, Alabama 36849, and my telephone number is (334) 844-2926. My curriculum vitae is attached as Attachment 2.

3. The purpose of our declaration is to analyze the performance remedy plans proposed by Bell Atlantic-New York ("BA-NY") in light of economic principles and to respond to arguments made by BA-NY and its expert witnesses concerning our critique of the BA-NY performance remedy plans. We conclude that the BA-NY performance remedy plans are entirely inadequate to prevent backsliding by BA-NY and should be revised and strengthened significantly.

## **I. Introduction**

4. The goal of an enforcement program is to ensure compliance with particular rules that are, absent the program, contradictory to the self-interest of the regulated entity. Establishing a set of rules, however, is only the first step in effective enforcement. After the rules are established, the regulated entity will choose whether or not to comply with those rules. Once the regulated firm makes this decision and acts, the enforcement agency must be able to accurately assess whether or not compliance has occurred. Finally, if a determination of non-compliance is reached, a fine or remedy that extracts the entire reward from non-compliance must be assessed. Through an effective enforcement program, the steps of which were just described, the incentives of the regulated entity are altered by making the expected value of non-compliance zero (or negative). With nothing to gain from breaking the rules, compliance is encouraged.

## **II. Optimal Fines**

1. In a standard cost-benefit framework, an enforcement program will alter the benefits of non-compliance by extracting any gain to the regulated firm from the offending action through a fine or remedy.<sup>1</sup> For example, if the expected value of breaking a rule is \$50, then a fine of \$50 or more would make non-compliance an unprofitable action. This \$50 fine would be an effective deterrent, however, only if the regulated firm knows that it will be detected and punished with 100% certainty. If there is only a 50% probability of being detected *and* punished, then the expected value of the fine is only \$25 [i.e.,  $0.5 \cdot \$50 + (1 - 0.5) \cdot \$0$ ], which is well below the \$50 benefit from non-compliance. Thus, in this scenario, compliance is not expected.

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<sup>1</sup> For a detailed exposition on the economics of crime and punishment, see Gary S. Becker, "Crime and Punishment: An Economic Approach," *Journal of Political Economy*, Vol. 76 (1968).

6. Within the standard economic framework of crime and punishment, the optimal remedy for noncompliance is

$$F^* = \frac{\text{Increased Profits}}{\text{Probability of Detection}} = \frac{\delta\pi}{\phi} \quad (1)$$

where the optimal fine ( $F^*$ ) is (at least) equal to the financial gain of non-compliance ( $\delta\pi$ ) divided by the probability of being detected and punished for the particular violation ( $\phi$ ).<sup>2</sup> If the firm expects to gain \$50 from non-compliance, and has a 50% chance of being detected and punished, then the optimal fine will be no less than \$100 ( $= \$50/0.50$ ). The relationship between the optimal fine and the probability of detection is illustrated in Figure 1. For some fixed expected gain ( $\delta\pi$ ), the optimal fine will be a declining function of the probability of detection ( $\phi$ ).

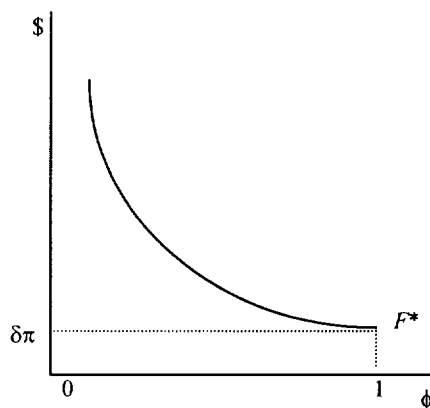


FIGURE 1.

#### A. A SIMPLE EXAMPLE

7. Parking a car in downtown Washington, D.C., provides a simple but effective example of the economics of crime and punishment. Assume that an individual plans to be in a shop for about an hour. The car can be parked in a parking deck for \$5 an hour or free on the street. Street parking is forbidden, however, and a fine of \$20 is levied for the offense. If there is only a 20% probability of being ticketed for illegal parking, then a rational individual will choose to park illegally since the expected “cost” of doing so is less than the \$5 parking lot fee ( $0.20 \cdot \$20 = \$4$ ). If the parking authority could increase the fine to \$30, however, illegal parking would be discouraged because the expected cost of doing so is \$6. Alternatively, holding the fine at \$20, the parking authority could hire more officers and increase the probability of detection. If the probability of detection and

<sup>2</sup> In the context of the New York Plan, the marginal decision is whether or not to comply. There is, by design, no continuous scale of discrimination.

punishment can be increased to 50%, then the expected cost of illegal parking will be \$10 and the offensive activity deterred.

8. This simple parking example illustrates the fact that in order to establish a remedy structure that encourages individuals or firms to comply with particular rules of conduct, we need to approximate  $\delta\pi$  and  $\phi$ . Generally, we expect  $\delta\pi > 0$  and  $0 \leq \phi < 1$ . If there is nothing to gain from non-compliance (i.e.,  $\delta\pi = 0$ ), then compliance is expected and no enforcement program is required. For a number of reasons, including the cost of implementation and administration, a perfect record of detection and punishment ( $\phi = 1$ ) is an unrealistic expectation.

#### B. INTERTEMPORAL GAINS

9. It is important to determine the intertemporal nature of the benefits from acts of non-compliance. In the parking example, the cost and benefits of the illegal activity are action specific. That is, there are few long-term consequences associated with the offending action. In the context of performance standards for the Regional Bell Operating Companies ("RBOCs"), the exact opposite is true. In general, the expected benefits of discriminatory treatment against competitive local exchange carriers ("CLECs") are neither case nor time specific. Rather, this discrimination would likely constitute a systematic attempt by the RBOC to slow the growth of competition in local exchange markets and to expand its own market share in long distance by disadvantaging its rivals. As a consequence, constructing punishment schemes on an occurrence specific basis will most likely be ineffective at deterring the discriminatory conduct of the RBOCs.

10. Discrimination against CLECs provides three potential sources of economic gain for the RBOC. First, the customer may view the CLEC (or the aggregation of CLECs) as offering sub-standard service and decide not to switch to the CLEC and to remain a customer of the RBOC. In this case, the RBOC will reap not only the benefit of keeping the customer for a few extra days or months, but potentially many years. For example, assume that non-compliance with a particular rule allows an incumbent firm to keep a single customer from defecting to an actual or potential rival. For simplicity, also assume that this customer generates \$1 per month (\$12 per year) in profits for the regulated firm. The size of  $\delta\pi$  depends, of course, on how long the incumbent will be able to keep the customer and extract that \$1 per month in profits. Assume that the non-compliant action ensures the incumbent will keep the customer for 5 more years. The discounted present value of the expected value of that customer over the next 5 years is \$45.50.<sup>3</sup> Thus, with 100% probability of detection and punishment,  $F^*$  is \$45.50 (\$45.50/1). If the probability of detection and punishment falls to 75%, then the optimal fine is \$61 (\$45.50/0.75). If the customer remains with the incumbent for 10 years, then  $F^* = \$98$  (\$73.7/0.75).

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<sup>3</sup> Assumes an annuity of five-year length, a 10% discount rate compounded annually.

11. The second potential source of economic gain for the RBOC is the systematic deterrence of competitive entry in the local exchange market. For example, assume that the non-compliant action of the incumbent diminished the good reputation of the actual or potential rival. As a consequence, this single act of non-compliance protects, say, ten customers from defecting to the rival. If each customer generates \$1 per month in profit, and remains with the incumbent for five years, then the optimal fine is \$455 if detection and punishment is certain. If the probability of detection is 0.75, the fine is \$607. What is important here is that the fine, while levied against a single act of discrimination, is based on the more widespread effects of the discriminatory act. In this simple example, a single act of discrimination is more appropriately viewed as ten acts of discrimination.

12. A simple figure helps illustrate the point. In Figure 2, the increase in CLEC market share in the local exchange market is measured along the vertical axis and time ( $t$ ) is measured on the horizontal axis. If the RBOC provided parity service to the CLECs, then the growth in CLEC market share is measured by the line  $0X$ . Alternatively, if the RBOC discriminates in the quality of service provided to CLECs, the market share of rivals follows path  $0Z$ .<sup>4</sup> The benefit to the RBOC from discriminating against the CLEC can be measured at some arbitrarily chosen time in the future (say  $t^*$ ). At  $t^*$ , if parity service is provided, CLEC market share has risen by an amount  $0a$ . If the RBOC discriminates against the CLEC, then the market becomes less conducive to competition and the CLECs gain only  $0b$  market share. In this case, the benefit to the RBOC of discrimination (at time  $t^*$ ) against the CLEC is the financial value of the market share ( $a - b$ ).

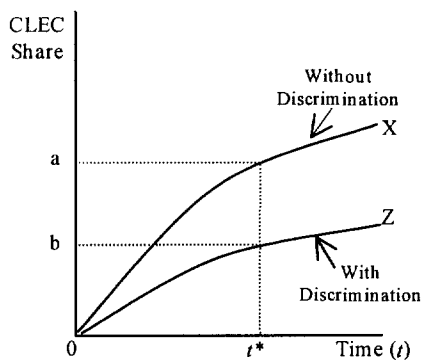


FIGURE 2.

13. As illustrated by the figure, providing poor service to CLECs in the earliest stages of competitive evolution, the RBOC may be able to extend the benefits of a few acts of discrimination to perhaps thousands of customers. For example, assume a CLEC, attempting to assess the ability of the RBOC to provision customers, orders 100 loops in

<sup>4</sup> With extremely poor performance, it is possible that CLECs will choose to exit the market so that CLEC market share actually declines over time rather than increasing at a slower rate than without discrimination.

a single month. If the RBOC successfully provisions the loops in a reasonable time frame, then the CLEC may increase its order next month to 1,000 loops. If the service remains acceptable, then 10,000 loops may be ordered the next month. Continued quality service from the RBOC may eventually allow the CLEC to mass market its competitive local exchange service using television, radio, and print ads.<sup>5</sup> With mass marketing, the CLEC may be able to increase its customer base by 100,000 loops in a given month.

14. This chain of events is broken, however, if the RBOC provides poor service to the CLEC on the first order of 100 loops. The CLEC, concerned about its reputation, will be reluctant to increase its loop orders by large amounts for fear of continued service problems. What could be an order of 100,000 loops in a few months shrivels into a few hundred. In the end, the RBOC will have retained thousands of customers by discriminating against fewer than one hundred. Under a case-specific enforcement approach, the RBOC will pay fines only for the twenty or so customers that received poor service in the first month. Yet, the economic gain from that discriminatory act was the profits from hundreds of thousands of customers.

15. A third source of financial reward for the RBOC is increased market share in the long distance business. If the RBOC has received long distance entry approval under Section 271, then by reducing the quality of its rivals' local exchange services it may be able to acquire the local and long distance business of its rivals' disgruntled customers. Thus, in addition to remedies based on protected market share in local exchange services, the established remedies must be high enough to extract the full financial reward to the RBOCs of gains in the long distance market acquired through discrimination against its local and long distance rivals.

#### C. FINES AND INTERTEMPORAL BENEFITS

16. Because the future is unknown, the exact determination of either  $\delta\pi$  or  $\phi$  is not possible. However, this fact does not imply that efforts to quantify these variables can be avoided. Properly sized remedies are necessary for an effective enforcement program.

17. In order to evaluate the effectiveness of a fine at deterring discriminatory conduct by the RBOC, the following simple formula can provide rough guidance:

$$F^* = \frac{\sum_{t=1}^T \pi_t \cdot n_t \cdot (1+r)^{-t}}{\phi} \quad (2)$$

where  $F^*$  is the optimal fine,  $t$  is time,  $n_t$  is the number of customers directly or indirectly affected by the discriminatory act in time period  $t$ ,  $\pi_t$  is the profit per customer during

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<sup>5</sup> At present, CLECs are restricted primarily to highly targeted telemarketing advertising.



some time period  $t$ ,  $r$  is the discount rate,  $\phi$  is the probability of detection, and  $T$  is the time horizon. The numerator of equation (2) is simply the discounted present value of the future stream of profits attained through discriminatory conduct. To evaluate the effectiveness of a proposed fine, the optimal fine  $F^*$  can be compared to the proposed fine  $f$ . If  $f < F^*$ , then the proposed fine is too small whereas if  $f > F^*$  the proposed fine is large enough (or potentially too large). Recall that fines below the optimal value do not deter offensive behavior.

18. Illustrative calculations from this formula are provided in Table 1. For simplicity, assume that the  $t$  is measured in years, the discount factor is 10%, and  $\pi$  is equal to \$12 (\$1 per month). One customer is provided poor service, but the effects of this act of discrimination spread to  $n$  customers. The probability of detection is either 100% or 50%. We also allow  $t$ , the number of years the customer is retained by the RBOC, to vary.

**Table 1. Optimal Monthly Fines**

( $\pi = \$1$  per month per customer)

| $n$     | Probability of Detection = 100% |           |           | Probability of Detection = 50% |           |            |
|---------|---------------------------------|-----------|-----------|--------------------------------|-----------|------------|
|         | 1 Year                          | 5 Years   | 10 Years  | 1 Year                         | 5 Years   | 10 Years   |
| 1       | 11 <sup>a</sup>                 | 45        | 74        | 22                             | 90        | 147        |
| 5       | 55                              | 227       | 369       | 110                            | 454       | 737        |
| 10      | 109                             | 455       | 737       | 218                            | 910       | 1,475      |
| 100     | 1,091                           | 4,549     | 7,373     | 2,182                          | 9,098     | 14,747     |
| 1,000   | 10,909                          | 45,489    | 73,735    | 21,818                         | 90,978    | 147,470    |
| 10,000  | 109,091                         | 454,894   | 737,348   | 218,182                        | 909,788   | 1,474,696  |
| 100,000 | 1,090,909                       | 4,548,944 | 7,373,481 | 2,181,818                      | 9,097,888 | 14,746,961 |

<sup>a</sup> Net Present Value of \$12 over 1 year.

19. The table makes clear the impact of systematic entry deterrence through discrimination on the optimal fine. Given our simplistic assumptions, the size of the fine is scaled by the number of customers the RBOC retains from discriminating against a single customer. If discriminating against a few customers today discourages CLECs from offering service on a wider scale, the gains to the RBOC from discrimination (and the optimal fine to deter such discrimination) can be enormous, even for low values of monthly profits (\$1 in this case).<sup>6</sup>

### III. Estimating the Financial Reward

20. Estimating the financial reward from discrimination requires a number of assumptions. The necessity of making a number of assumptions, some of which are more fact-based than others, should not deter the enforcement agency from doing so. Regardless of the enforcement scheme, the remedies must be sized. This task will either be methodological or arbitrary, the latter of which -- by ignoring the basic economics of

<sup>6</sup> For larger monthly profits, multiply the fines in the table by the estimated profit margin.

enforcement presented in this document -- offers little hope of effective enforcement.<sup>7</sup> So that all parties can contribute to the debate and adjustments to the remedies can be made in the future, the estimation approach should be clearly set forth. Consistent with the effects of discrimination illustrated in Figure 2, and using equation (2), we provide one possible estimation approach below.

A. SIZING THE FUND

21. One sensible proposal for estimating the number of customers retained (over time) from discrimination might be to assume that the RBOC will lose market share absent discrimination at a rate similar to that at which AT&T lost share in the 10 years following divestiture. In 1994, 10 years after divestiture, AT&T possessed a 70% market share of presubscribed lines.<sup>8</sup> Thus, we might assume that the RBOC would lose 30% market share over 10 years after local markets are open to competition. For simplicity, we might also assume this share loss occurs linearly at a rate of 3% per year. By providing poor quality wholesale services to the CLECs, the RBOC is able to attenuate its share loss. For example, moderate discrimination may reduce the rate of share loss to 2% per year (a one-third decline in the rate of share loss). At this lower rate of CLEC growth, the RBOC will have a market share of 80% at the end of 10 years. The discount rate has a range of plausible values; we assume a discount rate of 10%.

22. Consider the financial gain from deterring entry by CLECs using the UNE or Resale modes to enter the switched access line market. Assume that in State X the RBOC operates 3.5 million switched access lines (average of the fifty states) growing at a 5% annual rate. Absent discrimination, in the 10<sup>th</sup> year the RBOC will operate about 3.8 million of a total of 5.4 million access lines. CLECs will service the remaining 1.6 million lines. Assuming that by discriminating against CLECs in the first year -- damaging CLECs' reputations and discouraging mass market rollouts of local service -- the RBOC cuts its market share loss to only 20% over 10 years. At present, the average revenue per switched access line is about \$30-35 and we assume a 20% profit margin per line for a monthly profit of \$7 (at \$35 per month).<sup>9</sup> The present value of the financial reward from this discrimination is \$132 million over the 10-year horizon.

23. In practice, because fines below the financial gain will not deter discrimination, it might be sensible to add an additional amount to the financial reward. For example, the \$132 million might be adjusted upward by a factor of (say) 1.5 (50% increase) to ensure

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<sup>7</sup> The arbitrary selection of fines is evident in remedy levels that are identical across states. The financial reward of protecting market share will be larger in states with more customers and the remedies should reflect that fact.

<sup>8</sup> According to the 1994/5 *Statistics of Communications Common Carriers*, Table 8.12, AT&T had a market share of 70% of presubscribed lines.

<sup>9</sup> 1998 *Statistics of Communications Common Carriers*, Tables 2.9 and 2.10. Revenues are from Account Numbers 5001, 5002, 5050, 5081, 5082, and 5084 (Table 2.9).

the fines are adequately severe.<sup>10</sup> This “inflation” factor is not intended to raise the remedies to an arbitrarily high level or to inflict excessive punishment on the RBOC. Rather, this adjustment recognizes the fact that without the benefit of experience and data it is probably wise to err on the high side with respect to remedies to ensure effectiveness. In general, the level of remedies should be kept as close to the optimal level as is practically possible.

#### B. PROBABILITY OF DETECTION

24. This \$132 million reward is only the numerator of equation (2). Some estimate of the probability of detection is required to set the optimal fine. As shown in Table 2, dividing the \$132 million financial gain by the probability of detection yields a prescribed fine that may exceed \$1 billion (where  $\phi = 0.10$ ). Clearly, in this plausible scenario, fines that cannot exceed a few million dollars per year will not be effective. As discussed below, the design of many performance plans virtually ensures that the total fines levied, even with egregious non-compliance, will be far below the optimal fines.

| Table 2.                                       |                            |  |                            |
|--|----------------------------|--|----------------------------|
| Optimal Fines and the Probability of Detection |                            |  |                            |
| Probability of<br>Detection ( $\phi$ )         | Fine<br>( $F^*$ )<br>(mil) | Probability of<br>Detection ( $\phi$ ) | Fine<br>( $F^*$ )<br>(mil) |
| 100%   | \$ 132                     | 50%                                    | \$ 265                     |
| 90%  | 147                        | 40%                                    | 331                        |
| 80%  | 166                        | 30%                                    | 441                        |
| 70%  | 189                        | 20%                                    | 662                        |
| 60%  | 221                        | 10%                                    | 1,324                      |

25. What should be most clear from the table is that the remedies *do not* equal, except with perfect detection and punishment, the estimate of the financial gain to the RBOC (\$132 million). Rather, these fines are the financial reward scaled by the inverse of the probability of detection. Thus, in every plausible scenario (i.e.,  $\phi < 100\%$ ), effective remedies must exceed potential financial reward from discrimination.

26. The probability of detection ( $\phi$ ) is, perhaps, the most difficult variable to estimate. But without some knowledge of the probability of detection, it is impossible to assess whether or not a particular level of remedies will be effective. Guaranteed detection of non-compliance is never expected no matter how many resources are devoted to the enforcement program. If the enforcement agency was lucky enough to catch all offenders, some of these will escape punishment through administrative loopholes. In the present context, even if every potential source of discriminatory conduct was included in the performance measures and punishment was certain, the use of

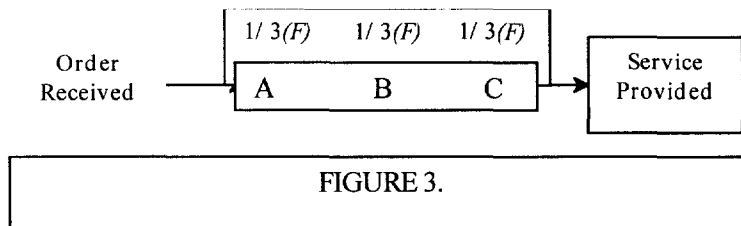
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<sup>10</sup> This markup could be included by adjusting the probability of detection downward (in this particular case reducing it to 0.25).

statistical testing of parity ensures that the probability of detection is not 100% (see Section IV).

27. We know that as the probability of detection and punishment ( $\phi$ ) falls, the remedy must increase. A number of features commonly found in performance plans have the effect of diminishing the probability of detection and/or punishment. For example, there are often sequential and complementary relationships between the various wholesale functions (and, consequently, the performance measures). The RBOC could substantially reduce competition by targeting its discriminatory conduct to any one of many wholesale functions that are part of a particular method of entry. By targeting discrimination, fines are paid only for particular measures while the effect of the discrimination is identical to a failure to comply with all measures.

28. Figure 3 illustrates the point. Assume there are three functions the RBOC must perform between the receipt of an order and the provisioning of the service (nodes A, B, and C). The regulator determines that failure to provide this service provides the RBOC with  $G$  dollars in profits that, when adjusted for the probability of detection, produce a fine of  $F$ . This fine represents the maximum remedy, which is divided by the design of the performance plan evenly among the three nodes A, B, and C. Obviously, the RBOC could provide adequate service at nodes A and B, but fail to provide parity service at node C. The service is not delivered (or delivered with poor quality), but only one-third of the maximum fine is paid. Compliance, in this case, is not expected. It is also possible that the failure to provide intermediate service A will mean the RBOC will never be evaluated on its performance at node B or C. In this latter case, the design of the performance plan allows the RBOC to reduce its exposure to fines (and competition) by severe discrimination in the first stages of service provision.



29. Effective performance plans must recognize the inherent order of things and the relationships between the various wholesale functions the RBOC must perform if local competition is to develop. In a chain of services required for offering a competitive local service, it only takes one failure to slow down the development of competition. *Ex ante* judgments about the importance of particular functions are guesses at best and must be open to revision.

30. One particularly troubling aspect of performance plans is the aggregation of performance statistics across CLECs, services, and time. Aggregation of multiple performance measures *unambiguously* understates the presence of discrimination. Aggregating performance statistics, whether through deriving a weighted average statistic

by using arbitrary “competitive significance” weights or through calculating a simple average, can mask evidence of rather severe discrimination in some areas with compliance in others. Likewise, arbitrary scoring methods (categorizing z-statistics as small, medium, or large) are particularly effective at diluting and masking evidence of discrimination. Depending on the scoring method, a performance test may not be capable of distinguishing between a (statistically significant) 2-day and a (statistically significant) 30-day delay in the provision of an unbundled element. Clearly, there is a substantial difference between the two in terms of the CLEC’s reputation and the development of competition.

31. Another potential problem with performance plans is the treatment of CLECs as a single entity by averaging performance provided to CLECs in the aggregate. Clearly, some CLECs are different than others. MCI WorldCom, for example, has deployed twice as many voice switches across the country than has any other CLEC.<sup>11</sup> By targeting discriminatory conduct toward more threatening rivals, such as MCI WorldCom, a RBOC can effectively slow the growth of competition without facing remedies.

32. Some performance plans provide for “allowable misses,” based on the fear of finding discrimination where none is present (Type I error). Allowable misses let the RBOC discriminate without consequence, which is clearly a reduction in the probability of detection and punishment. In certain cases, there may be misses. But, the ability to exclude misses, legitimate or not, unambiguously decreases the probability of detection. Some of the proposed performance plans establish statistical significance so as to establish equal risk of Type I and II error.<sup>12</sup> This “balanced risk” approach implies the RBOC is just as likely to be incorrectly found compliant as non-compliant. Without question, including “allowable misses” decreases the probability of detection and punishment and the remedies for non-compliance must be adjusted upward if the enforcement scheme is to be effective.

33. Furthermore, the mere fact that the data with which performance is tested is provided by the RBOC might reduce the probability of detection. In light of the remedies and other regulatory consequences of persistent non-compliance, it would be unrealistic to assume that the RBOC will always accurately report poor performance. While occasional audits may reduce the frequency of false reports, audits will by no means eliminate such strategic behavior.

34. Whether a consequence of design flaws or simply the inherent difficulties of designing effective enforcement programs, the probability of detection and punishment of

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<sup>11</sup> The 1999 CLEC Report, New Paradigm Resources Group, Chapter 8.

<sup>12</sup> For a discussion of equal risk, see AT&T and Ernst & Young, LPP, “Statistical Techniques for the Analysis and Comparison of Performance Measurement Data,” Docket U-22252, Subdocket C (filed La. Public Service Comm’n Oct. 15, 1999) (“Statistical Techniques”); see also AT&T/TCG, “Measuring Performance Parity: Equal Risk, Fair Results” (Mar. 1998) (available for downloading from [www.tcg.com/tcg/regulate/whitepaper/fairrisk.html](http://www.tcg.com/tcg/regulate/whitepaper/fairrisk.html)).

RBOC non-compliance will be substantially below 100%. As discussed in Section IV, the use of statistics (and the chosen critical values of the Z statistics) to determine parity indicates that  $\phi$  cannot exceed 85% or 95%, depending on the significance levels proposed by different parties. Given the complexities of measuring performance and the fact that not all forms of discrimination (as a practical matter) can be incorporated into a performance plan, we believe it is unreasonable to assume that the probability of detection and punishment will exceed, under the best of circumstances, 75% (3 of 4 acts of discrimination are detected and punished). Depending on the design of particular performance plans, the *upper bound* on detection and punishment could be substantially less than even 50%. At a 50% detection and punishment rate, the enforcement agency detects and punishes half of the discriminatory acts -- a rather high level of success for regulatory enforcement programs. This 50% detection rate is for *all* discriminatory acts and not just those that are measured in a performance plan.

35. Reducing the probability of detection through performance plan design may be inevitable. For example, certain amounts of aggregation may be necessary. However, as long as the remedies can be adjusted upward to account for the diminished probability of detection endemic to aggregation the potency of the enforcement program may not be diminished.<sup>13</sup> In theory, even if aggregation makes detection nearly impossible, a large enough remedy will promote compliance. In fact, nearly any performance plan is acceptable as long as the fines are set high enough. However, as illustrated in Table 2, *the remedies required for lower probabilities of detection are enormous*. Thus, aspects of enforcement plans that reduce the probability of detection and punishment should be avoided whenever possible.

#### IV. Effective Remedies and the LCUG Z

36. As mentioned in the preceding section, the "scoring" methodologies common in RBOC performance plans have the undesirable effect of reducing the probability of detection and punishment. An alternative, less problematic, way to punish more severe non-compliance is to use the LCUG Z.

37. As can be seen from Equation (2) the optimal fine is an increasing function of the number of customers affected ( $n$ ), the profit per customer ( $\pi$ ), the time horizon defining the duration of the benefits ( $t$ ), and the discount rate ( $r$ ); it is a decreasing function of the probability of detection and punishment ( $\phi$ ). MCI WorldCom has for sometime suggested that remedies could legitimately be based on the value of the LCUG Z, the statistic used to test for parity. MCI WorldCom, among others, proposed that the larger the LCUG Z in absolute value, the larger the fine or remedy should be.

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<sup>13</sup> This statement ignores the effects of risk preferences of the RBOCs.

38. This argument regarding the LCUG Z is consistent with the general view of punishment for discrimination presented above. To see this, consider the formula for the LCUG Z

$$Z_{LCUG} = \frac{\bar{X}_{CLEC} - \bar{X}_{ILEC}}{S_{ILEC} \sqrt{\frac{1}{m_{CLEC}} + \frac{1}{m_{ILEC}}}} \quad (3)$$

39. The  $\bar{X}$ 's are the sample means for either the CLEC or ILEC,  $S$  is the standard deviation of the ILEC sample, and  $m$  is the number of observations for the CLEC and ILEC. The LCUG Z will increase in absolute value with increases in the excess of the ILEC mean over the CLEC mean, with decreases in the ILEC standard deviation, and with larger values of  $m_{CLEC}$  (assuming that  $1/m_{ILEC}$  approaches zero).

40. Clearly, the ILEC's expected profit from discrimination will increase as the superiority of its performance per customer over that of the CLEC becomes more pronounced. This difference in performance between the ILEC and CLEC is measured by  $(\bar{X}_{ILEC} - \bar{X}_{CLEC})$ . Thus, the LCUG Z is an increasing function of the superiority of the ILEC's service and its profits. As indicated by equation (2), larger values of the LCUG Z prescribe larger remedies. Also, the smaller is  $S_{ILEC}$ , the more certain we are (and are the CLEC's potential customers) that an observed means difference is not illusory. Again, the larger the LCUG Z, the larger the fine should be. Finally, just as the number of customers affected (either directly or indirectly) increases the optimal fine, so is Z an increasing function of  $m_{CLEC}$ ; so again, larger Zs imply larger optimal fines.

41. Although MCI WorldCom's previous arguments relating to the relationship between remedies and the LCUG Z dovetail well with the optimal fine analysis, this current analysis adds two new dimensions to the discussion: 1) The time horizon for damages and 2) the probability of being detected and punished. The time dimension is completely new to the remedy discussions and an important addition to the analysis. Current increases in the profits of the ILEC (and damage to the CLEC) are only a fraction of the costs and benefits expected from discrimination. Account must be taken of the discounted present value of future profit streams and harm deriving from current discriminatory actions.

42. Regarding the incorporation of the probability of being detected and punished into our remedy analysis, it is important to realize that 100% detection and punishment is highly improbable. In fact, the LCUG Z statistical analysis allows us to determine that the maximum value for the probability of detection must lie below 100%. Recall that the probability of a Type II error is the probability of concluding that parity exists when it in fact does not. In other words, Type II error is the probability of the ILEC performing discriminatory service but not being detected as doing so. Thus, one minus this probability, i.e.,  $[1 - \text{Prob}(\text{Type II error})]$ , is a measure of the probability of the ILEC

being detected in a finable offense. Generally, we do not know the exact value of the probability of a Type II error, because it depends on the unknown value of the true means difference. But it is sensible to suggest that it is *at least equal* to the probability of a Type I error. Thus if  $\alpha = 0.05$ , then  $\phi$  is at most equal to  $1 - 0.05 = 0.95$ , so that the remedy inflation factor should be at least 1.053 ( $1/0.95$ ). However, if equal risk occurs at  $\alpha = 0.15$ , as was suggested by AT&T earlier in the proceedings, the remedy inflation factor becomes 1.176. Assuming \$100 million in remedies per year, ignoring the probability of getting caught amounts to not levying an additional \$5.3 million in fines in the first case and \$17.6 million in fines in the second case. Keeping in mind that these are only the minimum estimates of the understatement of the optimal fine (since 100% detection for practical and statistical reasons is unlikely), the errors can be sizeable.

## V. An Application: The New York Plan

43. In this section, we provide a review of the proposed performance plan for Bell Atlantic in New York State. The details of the New York Plan are provided in Attachment C to the Joint Declaration of George S. Dowell and Julie A. Canny (appendix A, volume 3 of BA-NY's 271 application) ("Dowell/Canny Decl."). In some respects, the enforcement plan proposed for BA-NY is roughly consistent with the theory of compliance outlined above. Some of the recent changes in the plan represent some improvement in its likely effectiveness. In some very important ways, however, the New York Plan suffers from defects that will substantially reduce its effectiveness. In this section, we will briefly review the shortcomings of the plan.

44. The New York Plan's consistency with the economic theory of crime and punishment is restricted to two major areas. First, the BA-NY Plan recognizes that compliance is "critical to the development of competition" (Dowell/Canny Decl., ¶ 139). Clearly, at some level the New York Plan correctly recognizes the *intertemporal* nature of the discriminatory provision of wholesale services (as illustrated in Figure 2) requiring remedies to be estimated using equation (2). Second, the Plan does not measure or levy remedies solely on a per occurrence basis. As described above, the effects of discrimination can extend well beyond the specific service order that is found to be "out of parity." To ensure compliance, remedy amounts must reflect the full financial reward -- across customers and over time -- from discriminatory conduct.

45. While properly motivated, the BA-NY plan is inconsistent with the economics of effective enforcement in a number of ways. First, there is no indication of how the size of the fund for remedy payments is determined. Without question, effective enforcement requires that the full financial reward from a failure to comply with the rules be extracted from the offender. If the maximum remedy is too low, then compliance cannot be expected. Second, the New York Plan does not consider the probability of detection and punishment. Even under the best of circumstances, the probability of detection is less than 100% and probably no better than 50%. As discussed in Section IV, the mere use of statistics to evaluate parity ensures a probability of detection less than 100%. Third, the



New York Plan masks discriminatory conduct through complex and arbitrary aggregation schemes, arbitrary allocation of remedies over functions and time, and redemption features allowing BA-NY to discriminate without sanction. Complicated aggregation schemes are particularly suspect when there is no evidence that aggregation is necessary or desirable. Fourth, the New York Plan includes no tests of BA-NY's performance in the provision of exchange access services. Because economic theory indicates that BA-NY will have a powerful incentive to discriminate against its long distance rivals by reducing the quality of such access services, it is *imperative* that the performance plan include metrics and remedy amounts to ensure non-discriminatory provision of exchange access services.

46. Within the theoretical framework of the economics of enforcement, the undesirable features of the BA-NY Plan can all be characterized as a reduction in the probability of detection and, as a consequence, a reduction in the effectiveness of the enforcement program. If these features of the New York Plan remain, then the remedies must be adjusted upward. If it is infeasible to raise remedies to the appropriate level, then those features of the plan that dilute the probability of detection and punishment should be eliminated from the New York Plan.

A. SIZING THE FUND

47. As we have indicated above, the first step in evaluating a performance plan is to estimate the value of discriminatory conduct against its CLEC rivals by Bell Atlantic in New York State. We focus only on the value of retaining the profits from the provision of local telephone service to business and residential switched access customers. Thus, our estimate represents a *lower bound* on the value of discriminatory conduct.<sup>14</sup> Our approach also assumes that BA-NY discriminates so severely that it will be required to pay all remedies related to the provision of local telephone service to business and residential switched access customers. This approach allows us to compare the maximum remedy to the financial value of "maximum" discrimination.

48. Following the methodology presented in Section III, we assume that absent discrimination, CLECs gain 3% market share per year (30% in 10 years) of the roughly 11.9 million switched access lines (assumed to grow at 5% annually) in New York (Local Competition: August 1999, Table 3.1).<sup>15</sup> According to the 1998 *Statistics of*

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<sup>14</sup> Our estimate is, of course, based on our assumptions. This "lower bound" reflects our attention to only a single service (i.e., local phone service).

<sup>15</sup> According to BA-NY's economic expert, this share loss rate may be too small. See Declaration of William E. Taylor, ¶ 44.

*Communications Common Carriers*, average local revenue per switched access line (business and residential) for BA-NY is about \$35-40 per month.<sup>16</sup>

49. In the first year, BA-NY chooses whether or not to provide parity service to its local competitors. To evaluate the adequacy of the maximum remedy, maximum non-compliance is assumed. Assuming that by discriminating in the first year -- damaging CLECs' reputations and discouraging mass market rollouts of local service -- BA-NY cuts its market share loss to only 2% per year (20% in 10 years). At a per line profit of 20% of revenue (\$7 at \$35 revenue) per line per month (excluding any profits from intraLATA or interLATA long distance services), the present value financial reward for discrimination equals \$381 million over the 10 year horizon.<sup>17</sup> This large sum is only the numerator of equation (2). As shown in Table 3 dividing the \$381 million financial gain by the probability of detection yields a prescribed remedy that may exceed \$3.8 billion (where  $\phi = 0.10$ ).

| Table 3  |                            |  |                            |
|--|----------------------------|--|----------------------------|
| Optimal Fines and the Probability of Detection |                            |  |                            |
| Probability of<br>Detection ( $\phi$ )         | Fine<br>( $F^*$ )<br>(mil) | Probability of<br>Detection ( $\phi$ ) | Fine<br>( $F^*$ )<br>(mil) |
| 100%   | \$381                      | 50%                                    | \$762                      |
| 90%  | 423                        | 40%                                    | 953                        |
| 80%  | 476                        | 30%                                    | 1,270                      |
| 70%  | 544                        | 20%                                    | 1,906                      |
| 60%  | 635                        | 10%                                    | 3,811                      |

50. Other assumptions about the effects of discrimination and share loss are possible. For example, assume that BA-NY is able to stop share loss completely in year 1 by failing all performance measures (and, consequently, paying the maximum remedies). Further, this discrimination reduces the rate of share loss by 10% to 2.7% per year. Under this alternative set of plausible assumptions, the financial gain over 10 years is \$315 million.

51. Under the New York Plan, remedies are paid to CLECs in the form of bill credits totaling no more than \$269 million annually, assuming that BA-NY's performance triggers remedy doubling under the Mode of Entry provision (Dowell/Canny Decl., ¶ 124). As a point of reference, this maximum remedy amount is about 3% of BA-NY's

<sup>16</sup> 1998 *Statistics of Communications Common Carriers*, Table 2.9. Revenues are from Account Numbers 5001, 5002, 5050, 5081, 5082, and most (about 90%) of 5084. The sum of these revenues is divided by total switched access lines.

<sup>17</sup> Assumes annual discounting at a 10% rate. At \$40 per month, the financial gain is \$436 million. This estimate of the financial gain from discrimination is higher than in previous versions of this analysis (filed with the New York State Public Service Commission) due to the inadvertent understatement of the number of switched access lines operated by BA-NY.

annual revenues and about 8% of its annual cash flow.<sup>18</sup> Over ten years, this maximum remedy will be much less than 1.5% of either revenue or cash flow.

52. While this “theoretically available” \$269 million might appear to be a large sum of money, the unanswered question is whether or not this amount is *large enough* to deter BA-NY from engaging in discrimination. Under the New York Plan, the maximum annual remedy for services related to switched access lines is more than \$100 million below our nearly \$400 million estimate of the value of non-compliance (even with 100% detection).<sup>19</sup> Moreover, our estimate does not take into account the profits that would accrue to BA-NY in the long distance and other markets as a result of its discrimination in the local market. Also, BA-NY could effectively reduce the growth of discrimination for switched access line customers by providing discriminatory service only for the UNE and Resale MOE and Critical Measure metrics. This would increase BA-NY’s financial gain from discrimination even more.

53. Even without adjusting for the probability of detection, the proposed remedies in the New York Plan are well below the financial gain to BA-NY. In addition to the maximum remedy being too low overall, there are a number of features of the plan that reduce the effectiveness even of these remedies. Those features are discussed in the next section.

#### B. PROBABILITY OF DETECTION

54. Guaranteed detection of non-compliance is never expected no matter how many resources are devoted to the enforcement program and the expense of detecting and prosecuting all violations certainly is prohibitive. Even if the enforcement agency was lucky (and rich) enough to catch all offenders, some of these will escape punishment through administrative loopholes. In the present context, even if every potential source of discriminatory conduct was included in the performance measures and punishment was certain, the use of statistical testing of parity ensures that the probability of detection is not 100% (see Section IV).

55. The probability of detection ( $\phi$ ) is, perhaps, the most difficult variable to estimate. Certainly, the probability of detection is less than 100% and probably above 0%. As discussed in Section IV, the use of statistics (and the chosen critical values of the Z statistics) to determine parity indicates that  $\phi$  should not exceed 85% or 95%, depending on the significance levels proposed by different parties. Even ignoring the

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<sup>18</sup> Revenues for Bell Atlantic in New York are approximately \$8 billion per year (1998 *Statistics of Communications Common Carriers*, Table 2.1) and cash flow is about 40% of revenues ([www.bellatlantic.com/invest/financial/statements/an\\_telecom\\_fin.htm](http://www.bellatlantic.com/invest/financial/statements/an_telecom_fin.htm)).

<sup>19</sup> The plan does provide for reallocation of remedy funds across the various plan provisions, but this reallocation is limited to the amounts available under the monthly caps.

effects of statistical testing, the New York Plan's aggregation and arbitrary remedies guarantees less than 100% detection.

56. As noted, the economics of enforcement indicate that as the probability of detection and punishment ( $\phi$ ) falls, the remedy must increase. Thus, without some determination of the probability of detection, it is impossible to assess whether or not a particular level of remedies will be effective. A number of features in the New York Plan have the effect of diminishing the probability of detection and/or punishment, and we discuss those features below. Importantly, no discussion of the probability of detection, or the sizing of the remedies, is found in the New York Plan. In addition to adjusting for the probability of detection and punishment, because remedies below the expected value of non-compliance are no more effective than no remedies at all, the *properly sized* maximum remedy might be adjusted upward by a factor of at least 1.5 (equal to a 50% increase in the remedy or a 50% decrease in the probability of detection) to ensure the remedies are adequately severe. With increased experience and data on the BA-NY performance and the effectiveness of the New York Plan, this "inflation" factor can be reduced because the remedies can be more accurately determined.

*Problems with the Maximum Remedy Approach*

57. One significant problem with the New York Plan is that the maximum annual remedies are equally divided among the twelve months. This division is entirely arbitrary and has no basis in effective performance. Clearly, severe discrimination in three months can be as effective as mild discrimination over twelve months. Yet, through this arbitrary division of the remedies, the effective remedies could be reduced by 75% simply by behaving exceptionally poorly in three months.

58. Second, because the remedy amounts are treated as bill credits, the remedy payments are restricted to the total dollar value of CLEC orders (Dowell/Canny Decl., att. C, exh. 1, p. 14). Since the remedies should include multiple years of damages covering many customers, the maximum remedy payments may never be reached. In a regulatory setting, delaying payment for perhaps many years provides BA-NY the opportunity to reduce their exposure with performance plan review proceedings and CLEC exit. Furthermore, the Commission typically requires that interest be assessed on delayed payments. The New York Plan includes no provision for interest. It is important to note that the cost-of-capital for small CLECs will be substantially above the 11.25% typically provided for by the Commission. In any case, if bill credits are delayed, some provision for interest payments must be included in the performance plan.

59. Third, the New York Plan is so complex and in some cases convoluted, that it is highly unlikely that the maximum remedies -- already set too low -- will ever be reached. The New York Plan simply has too many features that reduce the probability of detection and punishment and makes no adjustment to the remedies in recognition of this fact. As it stands, we believe the New York Plan will not perform its intended function.

60. An additional problem with setting a maximum remedy (and arbitrarily dividing it up by month) is that once the maximum is reached, the marginal cost of additional discrimination is zero. Thus, once the maximum is reached, the incentive to discriminate further is unconstrained. Without a cost to discrimination, BA-NY will engage in discrimination as long as there is some positive benefit from doing so. Compared to a remedy structure without a maximum, the use of a maximum remedy, when set too low, will actually increase discriminatory conduct. Overall, the usefulness of a maximum remedy is questionable. Accordingly, MCI WorldCom and AT&T have previously proposed performance remedy plans that are subject to only a "procedural cap," in which the regulatory authority would have the ability to review remedy payments made to individual CLECs over, say, \$10 million annually.<sup>20</sup> Relying on procedural caps instead of maximum remedy amounts would have the benefit of strongly incentivizing RBOCs to provide parity service to CLECs, while overriding the possibility that RBOCs would be subject to unlimited liability.

*Relationships Between Critical Measures*

61. Under the New York Plan, remedy dollars are divided up between the Mode of Entry ("MOE") provisions (Resale, UNE, Collocation, Trunks) and the Critical Measures provisions. Within a Critical Measure category, the dollars are again divided among each of the Critical Measures. Appendix A and B of the New York Plan provides the detailed distribution of remedy dollars among the MOEs and Critical Measures, but absolutely no detail as to how the distributions were determined.

62. Appendix B of the New York Plan illustrates the fact that BA-NY could substantially reduce competition by targeting its discriminatory conduct to any one of many "critical" performance measures. Certainly, BA-NY can reduce the risk of failing the "Mean Time to Repair" Critical Measure by gross non-compliance with provisioning. Few leased lines implies few repairs of leased lines. Or, BA-NY could delay or deny collocation (a remedy of \$208,333 per month) and avoid many of the UNE Critical Measures for CLECs requiring only an unbundled loop since collocation is required for this mode of entry.

63. An effective performance plan cannot ignore the relationships between the various wholesale functions that the RBOC must perform if local competition is to develop. The earlier versions of the New York Plan clearly failed to do so, but the latest proposal includes two schemes that attempt to remedy this prior shortcoming. The Amended New York Plan does allow for some reallocation of funds among its various categories, but the monthly caps remain in place (Dowell/Canny Decl., att. C, exh. 1, at 4). However, the reallocation process remains unspecified, making its effectiveness questionable. Also included in the Amended Plan is the "Domain Clustering Rule,"

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<sup>20</sup> See Letter from Karen T. Reidy, MCI WorldCom, to Michael Pryor, FCC, att. A, at 3 (June 2, 1999) (Attachment 3 hereto) (letter on behalf of MCI WorldCom and AT&T). This proposal did not discuss access performance remedies, because the parties were only addressing the issue of state remedy plans.

which is an attempt to deal with the consequences of the faulty aggregation procedures included in the New York Plan. While recognizing the importance of and attempting to deal with poor aggregation procedures is an improvement in the New York Plan, these two proposals treat the symptoms and not the disease. Layer upon layer of “fixes” only makes the plan more complex and less reliable. The current aggregation procedures in the New York Plan are faulty and beyond repair. For the New York Plan to be effective, a new aggregation procedure is required.

*Aggregation and Scoring of Performance Measures*

64. Aggregation of multiple performance measures, particularly in the manner proposed by the New York Plan, *unambiguously* understates the presence of discrimination. While some aggregation may be necessary for practical concerns, the aggregation techniques in the New York Plan are unnecessary and poorly designed. Aggregating performance statistics, as mentioned earlier, can mask evidence of rather severe discrimination in some areas with compliance in others. If detection-diluting aggregation schemes are used, then the remedies must be adjusted upward to compensate for the reduction in the probability of detection.

65. One aggregation problem with the New York Plan is the treatment of CLECs as a single entity. For example, in the Mode of Entry category, the performance measures are aggregated across CLECs. Since these performance metrics (or the wholesale functions they are measuring) have been selected as essential to the development of competition, the failure to provide non-discriminatory service to any particular CLEC could substantially reduce competition. By aggregating across CLECs, however, poor service to one or more CLECs could be masked by adequate service to others.

66. Aggregating CLEC performance measures is particularly problematic when some CLECs are different than others. As mentioned earlier, targeted discrimination against aggressive entrants such as MCI WorldCom can effectively slow the growth of competition without facing remedy payments. For example, targeting discrimination against a particular CLEC during a month when that CLEC was launching its service could be particularly effective at damaging its reputation. While the current New York Plan does test for discrimination against individual CLECs (the “Individual Rule”), bill credits are not provided unless the performance is consistently poor for at least two months (Dowell/Canny Decl. ¶ 142). There is no evidence on the record (of which we are aware) that shows that alternating between months of compliant and non-compliant behavior would not harm a CLEC’s ability to effectively compete and increase its market share. In fact, we would expect a higher variability in the quality of service to be just as damaging to the reputation and ability to serve as consistently poor performance (2 consecutive months) on the part of BA-NY.

67. Aggregation and testing with arbitrary scoring methodologies is particularly effective at diluting and masking evidence of discrimination. As in our earlier example, the scoring method proposed by BA-NY cannot distinguish between a (statistically

significant) 2-day and a (statistically significant) 30-day delay in the provision of an unbundled element. Ignoring the severity of the discrimination is problematic and inconsistent with the economics principles of effective enforcement. Aggregation is problematic in itself, but poor aggregation techniques only make things worse.

68. Additionally, the New York Plan allows BA-NY to eliminate evidence of marginal discrimination (a score of -1) by alternating compliance between measurement periods, because monthly performance scores of -1 are subject to change if in the following two months BA-NY obtains a performance score of 0 for a particular Critical Measure (Dowell/Canny Decl. ¶ 129). Compliance in later periods does not alleviate the undesirable effects of discrimination in the current period. Furthermore, alternating between acceptable and unacceptable performance from period-to-period increases the variance of CLEC quality over time. Rewarding uneven performance is not a desirable trait for an enforcement plan. Mixed with the arbitrary weighting and scoring scheme, redemption substantially weakens the effectiveness of the enforcement scheme.

69. While critical of aggregation, we recognize that some aggregation may be required. As long as the remedies can be adjusted upward to account for the diminished probability of detection endemic to aggregation, there is no problem. In theory, even if aggregation makes detection nearly impossible, a large enough remedy will promote compliance. In this regard, nearly any performance plan is acceptable as long as the remedies are set high enough. As illustrated in Table 2, the remedy amounts required for lower probabilities of detection are enormous and likely beyond the realm of political feasibility. Thus, aspects of enforcement plans that reduce the probability of detection, such as the arbitrary aggregation and remedy distribution schemes of the New York Plan, should be avoided at all costs.

#### *Allowable Misses and Minimum X's*

70. Citing fears of finding discrimination where none is present (Type I error), the New York Plan provides for "allowable misses," giving BA-NY the opportunity to record a certain number of misses without having to provide bill credits. In other words, the New York Plan allows BA-NY to discriminate without consequence. The ability to exclude misses, legitimate or not, unambiguously decreases the probability of detection. Thus, by including an "allowable misses" feature, the remedies for non-compliance must be increased if the enforcement scheme is to be effective.

71. Furthermore, it is not at all clear that any forgiveness of misses is justified. Anytime a statistical decision is made based on a hypothesis test, two types of errors can result. Type I errors, discussed above, result from rejecting a true null, and provide the statistical motivation for forgiveness. But this argument ignores Type II errors. Type II errors, discussed earlier, result from rejecting a false null. Except in extreme cases, it is not unreasonable to expect the probability of a Type II error to be at least equal to the probability of a Type I error. This means that we are at least as likely *not* to penalize an actual parity violation as we are to penalize an apparent violation inappropriately. From

a remedy perspective, this means that the two types of errors are a wash. That is, remedies that were paid by the ILEC but should not have been due to Type I error are offset by remedies that should have been paid by the ILEC but were not because of Type II error.

72. Forgiveness of discriminatory behavior permeates the New York Plan. In MOE scoring, for example, measures receiving a performance score of -1 do not elicit a remedy payment unless followed by another -1 in one of the following two months – the rationale being that the original statistic was due to random variation (Type I error). In addition, tests on each MOE submeasure elicit a performance score of -2, the lowest possible score, for a Z value of less than -1.645 ( $\alpha = 0.05$ ), but remedies are not paid from the distribution of the aggregate MOE scores until the 5% significance level is reached; they do not hit the maximum remedy until much higher performance scores are reached. This “Minimum -X” aggregate scoring system allows many misses each month before any remedies are levied (e.g., as many as 12 misses – out of 63 tests -- are allowed for the UNE MOE in the Amended Plan).<sup>21</sup> Clearly, this has important implications for the probability of detection and punishment.

73. Finally, the plan excuses all severe misses because submeasure performance scores “max out” at -2, and there is a Maximum -X value that defines a maximum remedy for each MOE. Once these maximum levels are hit, additional discrimination is costless. These illustrations should make it clear that the probability of detecting discrimination on the part of BA-NY based on its currently proposed performance plan is actually considerably less than 100%, and probably no more than 50%.

#### *Benchmark Standards*

74. Benchmark measures, or measures with absolute standards, differ from analogue or parity measures in that the ILEC does not typically produce these services for its own customers so that no direct CLEC-ILEC performance comparison is available.<sup>22</sup> The New York Plan deals with this type of measure better than some other performance plans in that there is no suggestion that a statistical test should be performed to determine if the benchmark has been met. However the proposed treatment of benchmarks is still problematic.

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<sup>21</sup> The number of misses allowed depends on the mix of performance score and the competitive weights. In this example, we assume all 12 misses receive a performance score of -1 and a competitive weight of 1, 5, or 10.

<sup>22</sup> CLECs have proposed that a benchmark standard should also be established for services with retail analogues, as a minimum standard, in addition to a rolling parity standard. Fixed standards (rather than rolling parity standards) are needed to allow CLECs to plan internal processes and operations and to allow CLECs to provide dependable dates and time periods to their customers. In such cases, the observations about benchmark measurements and statistical testing noted below still apply as the benchmark generally is set after taking into account random variations in analogous processes.



75. Benchmarks were clearly intended to be *minimum standards*. The problem with the New York Plan is that BA-NY attempts to unilaterally define new, lower minimum standards, circumventing the original process and intent underlying the creation of these variables.

76. Consider a benchmark measure representing a 95% standard. In order to fit it into its performance scoring scheme, BA-NY redefines the measure (see Dowell Canny Decl., att. C, exh. 1, app. F, p. 2). Any result greater than 95% receives a score of zero. A result of 0.95 receives a score of -1, and mandates some (50%) remedy payment in the case of Critical Measures or is deemed as possibly indicating discrimination in the case of MOEs. Decreases of 0.005 in the result translate to decreases of -0.10 in the performance score (with similar increase in remedies in the Critical Measure case) until a result of 0.90 and a corresponding performance score of -2 is reached. At this point, the full remedy is owed in the Critical Measures case or discrimination is viewed as likely in the MOE case.

77. Now consider the effect of this conversion to performance scoring. Originally, a result less than 0.95 would indicate discriminatory performance on the part of the ILEC and require a full remedy payment. Under the BA-NY performance scoring plan, it does neither. The original outcome is not reached until ILEC performance falls to 0.90, a full five percentage points below the original *minimum standard*. Indeed, there will be no remedy for violating the original minimum standard in the MOE case unless the inferior performance ( $0.9 < B < 0.95$ ) continues for at least one out of the next two months. Clearly the BA-NY plan lowers the effective benchmark substantially below its intended level.

78. The reason for this reduction in effective benchmark values is that BA-NY misinterprets the initial benchmark as a maximum standard, not as the minimum standard it is. Thus, if BA-NY wishes to define a result of 0.995 as scoring a -1 and increment down to a -2 at a result of 0.95, we would be considerably more sympathetic. As it stands, however, only a result of less than 0.90 will be judged to fully violate the benchmark, indicating ILEC discrimination in the form of a -2 performance score and requiring full remedy payment. While we are not insistent that -1 be scored for results between 0.995 and 0.95, we are insistent that a result of 0.95 requires the full remedy payment associated with a -2 performance score as originally intended.

79. In addition, the New York Plan details the number of allowable misses on small sample tests involving benchmarks (Dowell/Canny Decl., att. C, exh. 1, app. C, p. 3). In light of the above arguments, none of these are justified. Benchmarks are minimum standards that were developed taking into account (to the extent possible) random variation and process capability. Therefore if they are not met, no forgiveness is warranted.

## VI. Response to BA-NY Criticism

80. On behalf of BA-NY, Dr. Gregory Duncan has criticized our methodology as confusing total, marginal, and average concepts regarding the remedy structure. See BA-NY Reply Comments, Case 99-C-0949, exh. 1 (NYPSC, filed Oct. 8, 1999) ("Affidavit of Dr. Gregory M. Duncan"). He suggests that the appropriate numerator in the optimal remedy formula is the additional profit gained by the RBOC from additional discrimination, and the appropriate denominator should be the additional probability of detection attributable to additional discrimination. This approach, however, ignores important institutional factors affecting the problem at hand. Specifically, it ignores the initial position of the market from which the analysis springs. We must begin at a starting point of parity service provision, that is, no discrimination on the part of the RBOC. To begin from a position of extant RBOC discrimination would assume that the Telecommunications Act is already being violated. Thus when we consider the additional profit attributable to (extra) discrimination, we are looking at the difference in profit when we move from a state of nature characterized by parity service provision ( $\pi_1$ ) to one characterized by discriminatory service provision ( $\pi_2$ ).<sup>23</sup> Note that the appropriate margin at which to evaluate change is the discrete, one unit, change in states of nature – not, say, a one second change in order completion interval. A second initial condition is that in a known state of parity, the probability of detection must be zero. Thus any change in detection that results from moving from state 1 (parity) to state 2 (discrimination) must be equal to  $\phi$ , the probability of detecting discrimination in the new discriminatory state.

81. The final point to note is that, for a one unit change beginning at zero, the total change is equal to the average change and equal to the marginal change (i.e., in this case there is no confusion between total, average, and marginal because they are all the same). This means that the additional profit attributable to discrimination is  $(\pi_2 - \pi_1)$  and the additional probability of detection is  $(\phi - 0)$ , so that the optimal fine  $F^*$  is appropriately given by

$$F^* = \frac{(\pi_2 - \pi_1)}{(\phi - 0)} \approx \frac{\delta\pi}{\phi}$$

just as we state in equations (1) and (2) above. It is also worth noting that Dr. Duncan's other criticisms, which are all based on his specious distinction between average marginal and total, are also without merit.

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<sup>23</sup> Note that it is (in part) the design of the New York Plan that creates the dichotomous, on-off characteristic of discrimination. Our LCUG Z approach to measuring discrimination, discussed in Section IV of this document, would be more compatible with the analysis of Dr. Duncan because discrimination could be measured by (continuous) degrees of severity.

## VII. Summary

82. A number of interesting statistical questions arise when attempting to test for the discriminatory provision of wholesale services by an RBOC to the CLECs. Performance testing, however, is not an exercise in statistical theories. The goal of performance testing, and the remedies associated with those tests, is to encourage the RBOC to act in a manner inconsistent with its private interests. In order to accomplish this task, the incentives of the RBOC must be altered by making discriminatory conduct, which is profitable in itself, unprofitable by extracting all the profits acquired through discrimination with the diligent use of remedy payments. To do so, the remedies must be sized so that the expected payment of remedies -- equal to the remedy multiplied by the probability paying it -- equals the expected gain from discrimination. Unfortunately, this fundamental feature of effective enforcement has been ignored entirely by the enforcement plans we have reviewed.

83. Performance plans, by their very nature, will be somewhat complex, and uncertainty ensures that estimates of the financial rewards and the probability of detection will be educated guesses at best. However, complexity and uncertainty are not excuses for abandoning the underlying theory of effective enforcement. If effective enforcement is the goal, remedies cannot be sized or distributed across performance measures in an arbitrary fashion. Regardless of the enforcement scheme, the remedies must be sized. This task will either be methodological or arbitrary, the latter of which -- by ignoring the basic economics of enforcement presented in this document -- offers little hope of effective enforcement.<sup>24</sup> Estimating the financial reward from discrimination requires a number of assumptions. The requirement to make a number of assumptions, some of which are more fact-based than others, should not deter the enforcement agency from doing so. Further, so that adjustments to the remedies can be made, with contributions to the debate from all parties, the estimation approach should be clearly set forth. If the financial reward and probability of detection are ignored, then the enforcement plan has no legs to stand on, and its failure is virtually guaranteed.

84. The New York Plan is inconsistent with an effective enforcement plan in a number of ways. First, there is no indication of how the size of the fund for remedy payments is determined or why the remedies are believed to be effective. Our own rough estimates of the financial gain to BA-NY from discrimination in the local market equal nearly \$400 million, substantially exceed the proposed remedies of the New York Plan. These estimates, based on a plausible set of assumptions, include only the gains from local services and ignore the potential profits derived from BA-NY's provision of long distance services. Thus, the estimates should be viewed as a lower bound (under our set of chosen assumptions).

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<sup>24</sup> The arbitrary selection of fines is evident in remedy levels that are identical across states. The financial reward of protecting market share will be larger in states with more customers and the remedies should reflect that fact.

85. Second, the New York Plan does not consider the probability of detection and punishment. Even under the best of circumstances, the probability of detection is less than 100%. As discussed in Section IV, the use of statistics to evaluate parity ensures a probability of detection probably no more than 90%. The design of the New York Plan, as well as the difficulty of detection and punishment even under the best of circumstances, suggests that the probability of detection and punishment will not likely exceed 50%. For example, the probability of detection is reduced by the impracticality of testing for all potential forms of discrimination and, specifically, the exclusion of parity tests for the provision of exchange access service. At a 50% detection and punishment rate, the appropriate remedies for discriminatory conduct will exceed \$700 million, which is nearly three times the theoretically available maximum provided by the New York Plan. Clearly, the remedies established by the New York Plan are exceedingly low and, as a consequence, entirely ineffective.

86. Third, the design of the New York Plan has numerous features that reduce the probability of detection and punishment. For example, the manner in which the remedies are distributed across functions and time is entirely arbitrary. Clearly, six months of severe discrimination is worth twelve months of mild discrimination, but the New York Plan ignores this fact. Additionally, the New York Plan -- through complex and arbitrary aggregation and averaging -- can mask discriminatory conduct. Complicated aggregation schemes, particularly when they involve the aggregation of different CLECs, are particularly suspect when there is no evidence that aggregation is necessary or desirable. An extremely potent detection-diluting feature is the Plan's provision for excessive forgiveness of discriminatory conduct. For example, alternating between compliant and (mildly) discriminatory behavior from month to month invokes no remedy payments.

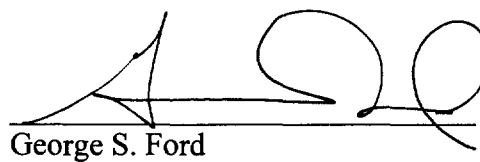
87. Fourth, the New York Plan's use of maximum remedy amounts and bill credits is undesirable for a number of reasons. Because properly sized remedy payments may easily exceed the monthly bills of a given CLECs, the remedy may not be paid for months, years, or ever. Further, the New York Plan provides no interest payments for delayed payments -- a fundamental flaw.

88. Given the absence of widespread facilities based competition as a constraint on the anticompetitive behavior of BA-NY, the effectiveness of the performance plan is important to the development of competition in New York's local exchange markets. A poorly designed plan with inadequate penalties will be mostly ineffective. And as we have described in some detail, a number of potentially serious flaws are currently part of the New York Plan.

89. This concludes our declaration.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 19, 1999.



George S. Ford

I declare under penalty of perjury that the foregoing is true and correct. Executed on  
October 18, 1999.

  
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John D. Jackson